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FOREWORD

More than sixty years have elapsed since Linde first liquefied air on a commercial scale and prepared the way for separating of other gaseous mixtures. His work, however, was not of an isolated nature. It was conceived eighteen years after air had, for the first time, been liquefied in the laboratory by Pictet in Geneva and Caillete in Paris. Linde's liquefaction of air was followed by Dewar's work on hydrogen liquefaction in London and by the setting up at Leiden of Kamerlingh Onnes's famous low temperature laboratory. These advances in low temperature or cryogenic technology have resulted in the establishment of a completely new and thriving industry.

Cryogenic engineering is concerned with developing and improving low temperature processes, techniques, and equipment; determining the physical properties of structural and related materials used in producing, maintaining, and using low temperatures; and the practical application of low temperature techniques and processes. These low temperatures are below those usually encountered in refrigerating engineering. It is rather difficult to assign a definite temperature which serves to divide refrigerating engineering from cryogenic engineering. A temperature below -150°C, however, is generally associated with cryogenic engineering.

There is ample reason for treating cryogenic engineering as a special field of engineering. The physical properties of materials at very low temperatures differ so markedly from those commonly encountered that the engineer cannot rely on his ordinary experience. Because of the rapid growth of this field of engineering in the past ten to fifteen years, many new and highly complex engineering problems have arisen in the low temperature field. In order to improve the interchange of information among organizations active in cryogenic engineering, the National Bureau of Standards – Atomic Energy Commission Cryogenic Engineering Laboratory in Boulder, Colorado, sponsored the first Cryogenic Engineering Conference on September 8, 9 and 10, 1954 at the National Bureau of Standards Boulder Laboratories. Succeeding conferences held in Boulder, Colorado, Boston, Massachusetts, and Berkeley, California have striven to continue the original idea of the conference.

To R.B. Scott, chief of the Cryogenic Engineering Laboratory of the National Bureau of Standards must go much of the credit for initiating these annual conferences. The first Cryogenic Engineering Conference Committee

headed by Scott was composed entirely of National Bureau of Standards' personnel. Subsequent committees have been elected for a two year term by delegates attending the conferences. The committee is presently composed of six members and a permanent secretary.

The 1954 conference was held as a part of the dedication and scientific meetings of the Boulder Laboratories with over two hundred delegates in attendance. The importance of this conference is noted with the continual increase in attendance and participation of scientists and engineers from all parts of the country and the world. Attendance at the Berkeley, California conference was close to seven hundred delegates.

Proceedings of each conference held to date have been published to further improve the interchange of information among low temperature engineers and scientists. The Proceedings of the 1954 Cryogenic Engineering Conference was originally published by the National Bureau of Standards as NBS Report 3517. Proceedings of successive conferences were published by the Cryogenic Engineering Conference. Publication funds were obtained from generous industrial contributions. Acknowledgment to these concerns is given in each Proceedings.

The demand for the Proceedings of these annual conferences, however, has far exceeded the supply. Consequently the Cryogenic Engineering Conference Committee in 1959 decided to reprint all the past Proceedings in a hard cover edition entitled "Advances in Cryogenic Engineering." Since the 1954 Proceedings was a government publication, permission was obtained from the National Bureau of Standards to re-edit NBS Report 3517 and reprint it as part of the above series.

Space does not permit acknowledgment of all individuals responsible for either the original or the reprinted Proceedings. Certainly the encouragement of many in the cryogenic engineering field and the cooperation of the University of Colorado are deeply appreciated by the editor.

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